

DEPARTMENT OF THE INTERIOR, CANADA

Hon. W. J. ROCHE, Minister; W. W. COOKE, Deputy Minister.

FORESTRY BRANCH—BULLETIN No. 17

R. H. CAMPBELL, Director of Forestry

FOREST PRODUCTS OF CANADA

1913

POLES AND CROSS-TIES

COMPILED BY

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LETTER OF TRANSMITTAL.

FORESTRY BRANCH,
DEPARTMENT OF THE INTERIOR,
OTTAWA, July 15, 1914.

SIR.—I beg to transmit herewith reports on the poles purchased and on the cross-ties purchased in the Dominion during the calendar year 1913, and to recommend their publication as Bulletin No. 47 of this Branch.

The first of these, namely, that on the poles purchased, contains an account of the poles purchased during the year above cited, both in the aggregate and also separately by (1) the steam railways and telephone and telegraph companies, and (2) by the electric railway, power and light companies. It also groups poles used according to their length. A diagram, comparative for the years 1912 and 1913, showing the number of poles purchased, according to kinds of wood, has been added.

The latter of the two reports, namely, that on the cross-ties purchased, contains an account of the cross-ties purchased during the same year by the different railway companies of Canada, steam and electric, both jointly and separately. A diagram similar to that for poles has also been added.

Your obedient servant,

P. H. CAMPBELL,
Director of Forestry.

W. W. COR
sq., C.M.G.,
Depl
Minister of the Interior,
Ottawa.

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POLES PURCHASED IN 1913.

Reports received from 424 pole purchasers in Canada in 1913 were used as a basis for the statistics in this bulletin. These pole purchasers consisted of 218 telephone companies, 155 electric light and power concerns, 29 electric railways, 18 steam railways and 4 telegraph companies.

The statistics have been divided into two main groups: first, those received from steam-railway, telegraph and telephone companies, and second, those received from electric railway, power and light concerns.

Table 1 gives the details of the poles purchased in Canada in 1913 by kinds of wood divided into these two main classes.

TABLE 1.

POLES PURCHASED, 1912 AND 1913, BY KINDS OF WOOD AND CHIEF USES— Number, Total Value, Average Value and Percent Distribution.

| Kind of Wood. | 1912 | | | | 1913 | | | |
|--------------------|----------------|---------------------|-------------|--------------|----------------|---------------------|-------------|--------------|
| | Number. | Value. | Avg. Value | Per Cent. | Number. | Value. | Avg. Value | Per Cent. |
| TOTAL OF ALL USES. | | | | | | | | |
| Total | 608,556 | \$ 1,113,524 | 1 83 | 100 0 | 534,592 | \$ 1,188,331 | 2 22 | 100 0 |
| White Cedar | 378,369 | 613,580 | 2 83 | 62 2 | 264,267 | 525,853 | 1 99 | 49 4 |
| Red Cedar | 144,222 | 408,472 | 2 83 | 2 37 | 145,569 | 488,138 | 3 35 | 27 2 |
| Tamarack | 36,158 | 46,822 | 1 29 | 5 9 | 115,517 | 155,682 | 1 35 | 21 6 |
| Spruce | 9,127 | 10,334 | 1 13 | 1 5 | 5,228 | 6,046 | 1 16 | 1 0 |
| Jack Pine | 1,790 | 2,710 | 1 51 | 0 3 | 1,450 | 1,299 | 0 90 | 0 3 |
| Balsam Fir | 38,000 | 30,400 | 0 80 | 6 2 | 1,437 | 1,841 | 1 28 | 0 3 |
| White Pine | | | | | 682 | 8,095 | 11 37 | 0 1 |
| Chestnut | 228 | 147 | 0 64 | * | 167 | 94 | 0 56 | * |
| Cypress | | | | | 128 | 1,056 | 8 25 | * |
| Hemlock | 50 | 65 | 1 30 | * | 92 | 32 | 0 35 | * |
| Western Larch | | | | | 39 | 163 | 4 18 | * |
| Ash | | | | | 16 | 32 | 2 00 | * |
| Douglas Fir | 612 | 994 | 1 62 | 0 1 | | | | |

STEAM RAILWAYS AND TELEPHONE AND TELEGRAPH COMPANIES.

| | | | | | | | | |
|--------------|----------------|-----------------|-------------|--------------|----------------|-----------------|-------------|--------------|
| Total | 549,560 | \$30,793 | 1 51 | 100 0 | 469,521 | \$33,259 | 1 77 | 100 0 |
| White Cedar | 341,240 | 462,964 | 1 36 | 62 1 | 230,360 | 382,657 | 1 66 | 49 1 |
| Red Cedar | 122,925 | 278,846 | 2 27 | 22 4 | 115,714 | 282,389 | 2 44 | 24 6 |
| Tamarack | 36,158 | 46,822 | 1 29 | 6 6 | 115,212 | 152,675 | 1 33 | 24 5 |
| Spruce | 8,567 | 7,869 | 0 92 | 1 6 | 4,393 | 4,150 | 0 94 | 0 9 |
| Jack Pine | 1,790 | 2,710 | 1 51 | 0 3 | 1,450 | 1,299 | 0 90 | 0 3 |
| Balsam Fir | 38,000 | 30,400 | 0 80 | 6 9 | 1,437 | 1,841 | 1 28 | 0 3 |
| White Pine | | | | | 682 | 8,095 | 11 87 | 0 1 |
| Chestnut | 228 | 147 | 0 64 | * | 167 | 94 | 0 56 | * |
| Hemlock | 40 | 40 | 1 00 | * | 90 | 27 | 0 30 | * |
| Ash | | | | | 16 | 32 | 2 00 | * |
| Douglas Fir | 612 | 995 | 1 63 | * | | | | |

* Less than one-tenth of one per cent.

TABLE 1—Continued.

POLES PURCHASED, 1912 AND 1913, BY KINDS OF WOOD AND CHIEF USES—
Number, Total Value, Average Value and Percent Distribution.
ELECTRIC RAILWAY, POWER AND LIGHT COMPANIES

| Total | 58,986 | 282,731 | 4.79 | 100.0 | 65,971 | 355,972 | 5.45 | 100.0 |
|---------------|--------|---------|------|-------|--------|---------|------|-------|
| White Cedar | 37,129 | 150,615 | 4.06 | 62.9 | 33,907 | 143,196 | 4.22 | 52.1 |
| Red Cedar | 21,297 | 129,626 | 6.09 | 36.1 | 29,855 | 205,749 | 6.89 | 45.9 |
| Spruce | 560 | 2,465 | 4.40 | 0.9 | 835 | 1,896 | 2.27 | 1.1 |
| Tamarack | | | | | 305 | 3,007 | 9.89 | 0.7 |
| Cypress | | | | | 128 | 1,056 | 8.25 | 0.1 |
| Western Larch | | | | | | | | |
| Hemlock | | | | | 39 | 163 | 4.18 | * |
| | 10 | 25 | 2.50 | • | 2 | 5 | 2.50 | * |

* Less than one-tenth of one per cent.

The consumption of wooden poles in Canada varies greatly from year to year. There was a decrease of about 30 per cent in the numbers purchased from 1910 to 1911, an increase of 3.9 per cent from 1911 to 1912, and a decrease of 12.2 per cent from 1912 to 1913.

Eastern white cedar (*Thuja occidentalis*) still heads the list, as it always has done in the past. The supply of good eastern white cedar poles, however, is visibly decreasing, as is demonstrated by the fact that at least 20 per cent of the poles purchased in 1913 were imported from the United States. The western species of red cedar (*Thuja plicata*) is more abundant and is now taking the place of the eastern species, especially in the greater length-classes. Poles of this wood are used extensively in the western provinces and more particularly in British Columbia, where this tree grows. In the Prairie provinces the poles are about half of the eastern species and half of the western. Of the red cedar poles purchased in 1913, over 8 per cent were imported from the Pacific States, and were classed as "Idaho red cedar," although these are of the same species as those obtained from British Columbia.

Out of a total of 534,592 poles, 12.1 per cent were reported as having been imported from the United States in 1913.

While the total number was a decrease from 1912 to 1913, the total value showed an increase of 6.7 per cent, caused by an increase in the average price amounting to \$0.39.

Telephone and telegraph companies and railway companies operating telephone and telegraph lines used 87.8 per cent of all the poles purchased in Canada in 1913. This is a decrease in numbers of 14.6 per cent, and an increase in value of 0.3 per cent, the average value to these companies increasing by \$0.26.

All the jack pine, balsam fir, white pine, chestnut and ash poles were purchased by companies of this class.

The electric railway, power and light companies' purchases formed only 12.2 per cent of the total, but these poles cost on an average \$3.68 more than those purchased by the telephone and telegraph companies.

The total number was an increase of 10.3 per cent over 1912; while the average price was an increase of \$0.66. These companies imported over 5 per cent of the poles they used in 1913. They purchased all the cypress poles imported into Canada during that year and also all the western larch poles from British Columbia.

The average prices given for certain kinds of poles which have been purchased in small quantities cannot be considered as indicative of the intrinsic value of that particular wood for pole purposes, or even as a fair gauge of its market value, as these individual prices are affected by so many outside conditions, such as cost of transportation, size, etc.

Table 2 gives the details with regard to the poles purchased in Canada in 1913, by kinds of wood, and divided into five length-classes.

TABLE 2.

POLES PURCHASED, 1912 AND 1913, BY LENGTH-CLASSES AND KINDS OF WOOD—
Total Value, Average Value and Percent Distribution.

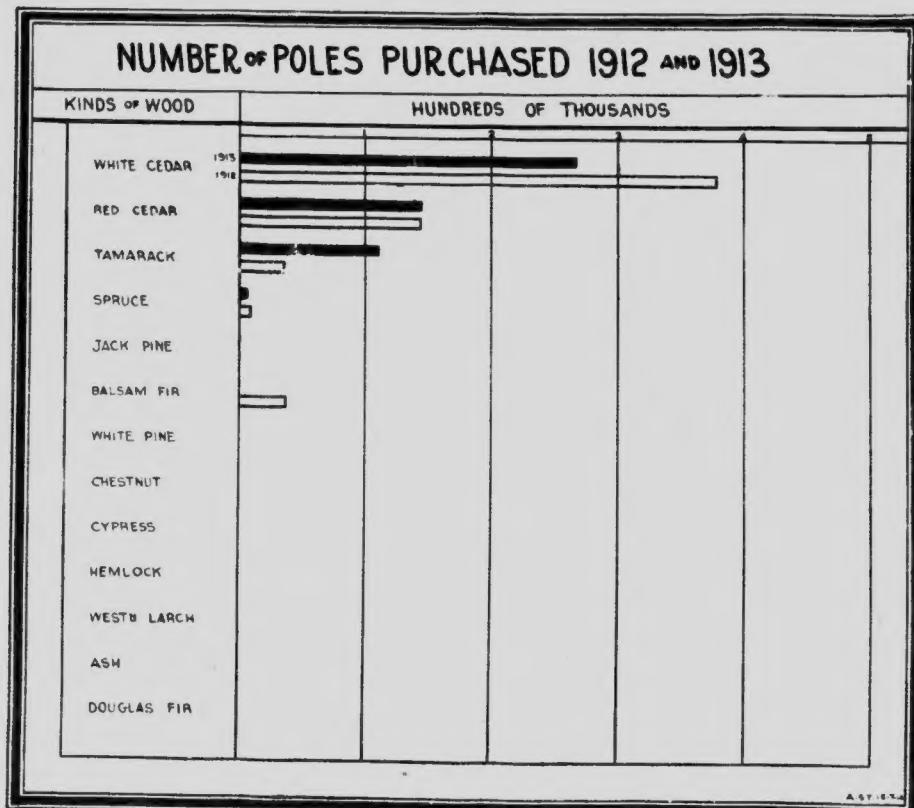
| Kind of Wood. | Number. | Value. | Avg. Value. | Per Cent. | Number. | Value. | Avg. Value. | Per Cent. |
|--------------------------------|---------------------------|------------------|-------------|--------------|--------------------------------|----------------|-------------|--------------|
| | Total—All Length-classes. | | | | 20 to 25 feet (63.8 per cent.) | | | |
| Total | 534,592 | 1,188,331 | 2 22 | 100.0 | 340,863 | 463,665 | 1 36 | 100.0 |
| White Cedar | 264,267 | 525,853 | 1 99 | 49.4 | 159,064 | 192,908 | 1 21 | 46.7 |
| Red Cedar | 145,569 | 488,138 | 3 35 | 27.2 | 60,028 | 112,821 | 1 88 | 17.6 |
| Tamarack | 115,517 | 155,682 | 1 35 | 21.6 | 114,564 | 151,386 | 1 32 | 33.6 |
| Spruce | 5,228 | 6,046 | 1 16 | 1.0 | 4,357 | 3,972 | 0 41 | 1.3 |
| Jack Pine | 1,450 | 1,299 | 0 90 | 0.3 | 1,375 | 1,125 | 0 82 | 0.4 |
| Balsam Fir | 1,437 | 1,841 | 1 28 | 0.3 | 1,202 | 1,299 | 1 08 | 0.4 |
| White Pine | 682 | 8,095 | 11 87 | 0 1 | 2 | 1 | 0 50 | 0 |
| Chestnut | 167 | 94 | 0 56 | * | 167 | 94 | 0 56 | * |
| Cypress | 128 | 1,056 | 8 25 | * | 90 | 27 | 0 30 | * |
| Hemlock | 92 | 32 | 0 35 | * | 16 | 32 | 2 00 | * |
| Western Larch | 39 | 163 | 4 18 | * | | | | |
| Ash | 16 | 32 | 2 00 | * | | | | |
| 26 to 30 feet (21.8 per cent.) | | | | | | | | |
| Total | 116,297 | 294,162 | 2 53 | 100.0 | 38,166 | 148,639 | 3 89 | 100.0 |
| White Cedar | 70,144 | 165,379 | 2 36 | 60.3 | 21,356 | 75,835 | 3 55 | 56.0 |
| Red Cedar | 44,942 | 126,292 | 2 81 | 38.6 | 16,073 | 70,979 | 4 42 | 42.1 |
| Tamarack | 662 | 1,150 | 1 74 | 0.6 | 75 | 179 | 2 39 | 0.2 |
| Spruce | 347 | 892 | 2 61 | 0.3 | 480 | 972 | 2 03 | 1.3 |
| Balsam Fir | 150 | 333 | 2 22 | 0.1 | 75 | 179 | 2 39 | 0.2 |
| Jack Pine | 50 | 111 | 2 22 | * | 20 | 48 | 2 40 | * |
| Cypress | 2 | 5 | 2 50 | * | 75 | 402 | 5 36 | 0.2 |
| Hemlock | 2 | 5 | 2 50 | * | 12 | 45 | 3 75 | * |
| Western Larch | | | | | | | | |
| 36 to 40 feet (4.4 per cent.) | | | | | | | | |
| Total | 23,939 | 141,431 | 5 91 | 100.0 | 15,325 | 110,434 | 9 16 | 100.0 |
| White Cedar | 9,443 | 51,214 | 5 42 | 39.4 | 4,260 | 40,517 | 9 51 | 27.8 |
| Red Cedar | 14,371 | 89,603 | 5 91 | 60.0 | 1,055 | 88,443 | 8 71 | 66.3 |
| Tamarack | 10 | 30 | 3 00 | * | 206 | 2,937 | 14 26 | 1.3 |
| Spruce | 43 | 205 | 4 77 | 0.2 | 1 | 5 | 5 00 | * |
| Balsam Fir | 10 | 30 | 3 00 | * | | | | |
| Jack Pine | 5 | 15 | 3 00 | * | | | | |
| White Pine | 42 | 274 | 6 52 | 0.2 | 638 | 7,820 | 12 26 | 4.2 |
| Cypress | | | | | 53 | 654 | 12 34 | 0.3 |
| Western Larch | 15 | 60 | 4 00 | 0.1 | 12 | 58 | 4 83 | 0.1 |

*Less than one-tenth of one per cent.

The greater part of the poles purchased in 1913 were less than 25 feet in length, and of this class the two cedar species and eastern tamarack together formed over 97 per cent. All the chestnut and ash poles were of this length, and the eastern tamarack poles were more numerous in this class than those of western red cedar, which is only true for this length-class.

In the 26-to-30-foot class the two cedars formed together 98.9 per cent, and tamarack poles became of little relative importance. While the cedar species still formed by far the greater part of the poles in the 31-to-35-foot class, poles of spruce become more important, and cypress poles appeared for the first time. White pine and western larch poles appeared in the 36-to-40-foot class, and here red cedar became more important than white, which is not the case with the shorter classes of poles. In the class of poles over 40 feet in length, red cedar formed over two-thirds of the total.

The diagram below shows, in graphic form, the number of poles of different kinds of wood used in 1912 and 1913:—



CROSS-TIES PURCHASED IN 1913.

This bulletin is based on reports received from 47 steam railways and 32 electric railways purchasing ties in 1913. The total number of ties purchased was 19,881,714, valued at \$8,740,849, and of this total, 3,254,587 ties, valued at \$1,827,358, were reported as having been purchased in the United States. This brings out the fact that Canadian railway companies import 16.4 per cent of their tie material and pay on an average 13 cents a tie more for this than for the native article.

Table 3 gives the details of the ties purchased in Canada in 1912 and 1913, by kinds of wood.

TABLE 3.

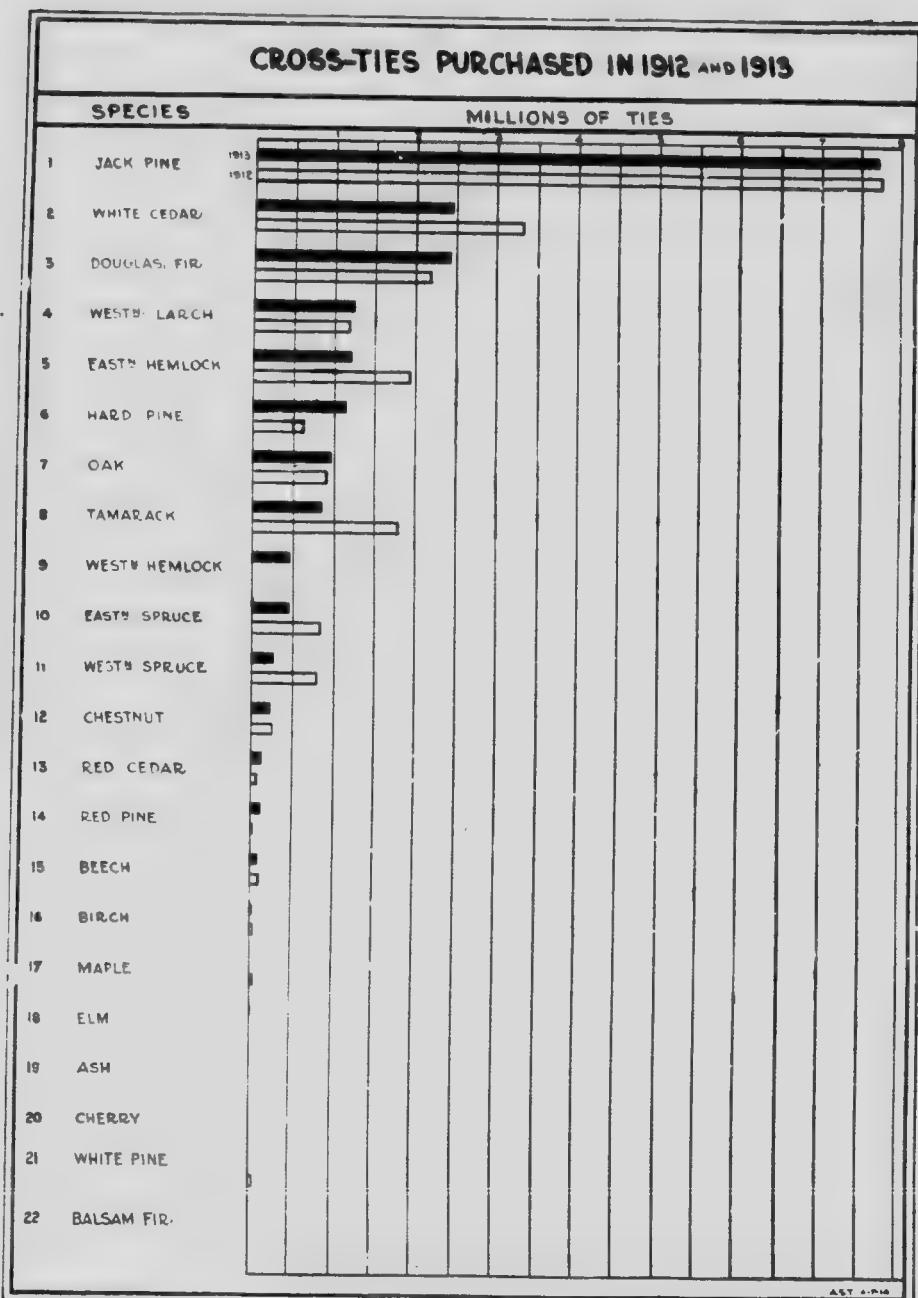
CROSS-TIES PURCHASED, 1912 AND 1913, BY KINDS OF WOOD—Number, Value, Average Value and Percent. Distribution.

| Kind of Wood. | 1912. | | | | 1913. | | | |
|-----------------|-------------------|------------------|-------------|--------------|-------------------|------------------|-------------|--------------|
| | Number. | Value. | Av. + Per | | Number | Value. | Av. + Per | |
| | | | Value. | Cent | | | Value. | Cent |
| | | | \$ | \$ c. | | | \$ | \$ c. |
| Total | 21,309,571 | 8,373,869 | 0 44 | 100 0 | 19,881,714 | 8,740,849 | 0 43 | 100 0 |
| Jack Pine | 7,783,034 | 3,417,238 | 0 44 | 36.5 | 7,773,674 | 3,103,140 | 0 40 | 39.1 |
| White Cedar | 3,332,105 | 1,486,456 | 0 45 | 15.6 | 2,451,527 | 1,090,436 | 0 44 | 12.3 |
| Douglas Fir | 2,183,554 | 661,891 | 0 30 | 10.2 | 2,427,100 | 801,710 | 0 33 | 12.2 |
| Western Larch | 1,196,184 | 514,359 | 0 43 | 5.6 | 1,225,956 | 636,631 | 0 52 | 6.2 |
| Hemlock | 1,047,474 | 743,535 | 0 38 | 9.1 | 1,199,699 | 455,662 | 0 38 | 6.0 |
| Hard Pine | 658,096 | 434,840 | 0 66 | 3.1 | 1,138,351 | 621,032 | 0 55 | 5.7 |
| Oak | 933,486 | 624,174 | 0 67 | 4.4 | 978,554 | 673,244 | 0 69 | 4.9 |
| Tamarack | 1,803,696 | 806,049 | 0 45 | 8.5 | 866,231 | 369,666 | 0 43 | 4.4 |
| Western Hemlock | | | | | 479,113 | 148,725 | 0 31 | 2.4 |
| Spruce | 835,121 | 330,854 | 0 40 | 3.9 | 458,256 | 151,049 | 0 33 | 2.3 |
| Western Spruce | 8,000 | 4,640 | 0 58 | * | 267,917 | 70,685 | 0 54 | 1.3 |
| Chestnut | 266,082 | 157,225 | 0 59 | 1.2 | 232,179 | 126,795 | 0 55 | 1.2 |
| Red Cedar | 82,357 | 29,109 | 0 35 | 0.4 | 115,578 | 77,328 | 0 67 | 0.6 |
| Red Pine | 26,646 | 12,673 | 0 48 | 0.1 | 11,852 | 52,112 | 0 45 | 0.6 |
| Beech | 103,583 | 70,220 | 0.68 | 0.5 | 96,923 | 60,552 | 0 62 | 0.5 |
| Birch | 37,943 | 22,605 | 0 60 | 0.2 | 24,736 | 10,447 | * | 0 1 |
| Maple | 51,465 | 39,681 | 0 77 | 0.2 | 16,860 | 14,381 | * | 0 1 |
| Elm | 2,868 | 1,361 | 0 47 | * | 13,674 | 6,421 | * | 0 1 |
| Ash | | | | | 503 | 216 | 0 40 | * |
| Cherry | | | | | 31 | 17 | 0 55 | * |
| White Pine | 44,408 | 15,348 | 0 35 | 0.2 | | | | |
| Balsam Fir | 12,469 | 1,621 | 0 13 | 0.1 | | | | |

*Less than one-tenth of one per cent.

The decrease in the number of ties purchased in 1913 was 6.7 per cent of the total for 1912. Out of twenty kinds of wood reported, the two most important—jack pine and white cedar—were reported in smaller quantities than in 1912, as were seven of the other kinds of wood.

The diagram below shows, in graphic form, the total number of cross-ties of different species purchased in 1912 and 1913:—



The use of Douglas fir increased, and ties of that wood formed 12.2 per cent of the total as compared to 10.2 per cent in 1912. The use of this wood has steadily increased since 1908. Four other British Columbia species, namely Western larch, spruce, hemlock and red cedar, all showed increases from 1912 to 1913. The eastern species of these woods all showed decreases during the same year. Oak ties, of which the greater part are imported, were purchased in increased numbers, but all the other hardwoods, with the exception of elm, showed decreases.

The average price of ties of all classes was practically the same in 1913 as in the preceding year. The two most important woods were purchased at a slightly lower price than in 1912, and of the others, five showed increases and eight decreases.

Table 4 shows the details with regard to the ties purchased by the 47 steam railways in 1912 and 1913, by kinds of wood.

TABLE 4.

CROSS-TIES PURCHASED, 1912 AND 1913, BY STEAM RAILWAYS BY KINDS OF WOOD—Number, Value, Average Value and Percent Distribution.

| Kind of Wood. | 1912. | | | | 1913. | | | |
|-----------------|-------------------|---------------------|--------------------|--------------|-------------------|---------------------|--------------------|--------------|
| | Number. | Value. | Av. Value | Per cent. | Number. | Value. | Av. Value | Per cent. |
| Total | 29,525,269 | \$ 1,813,625 | \$cts. 0 44 | 100.0 | 19,490,491 | \$ 8,245,166 | \$cts. 0 42 | 100.0 |
| Jack Pine | 7,757,418 | 3,402,417 | 0 44 | 37.3 | 7,706,720 | 3,070,003 | 0 40 | 39.5 |
| Douglas Fir | 2,026,624 | 593,859 | 0 29 | 19.7 | 2,421,118 | 799,271 | 0 33 | 12.4 |
| White Cedar | 3,172,629 | 1,398,774 | 0 44 | 15.2 | 2,305,868 | 1,013,763 | 0 44 | 11.8 |
| Western Larch | 1,196,184 | 514,359 | 0 43 | 5.7 | 1,223,444 | 634,742 | 0 52 | 6.3 |
| Hemlock | 1,894,711 | 720,109 | 0 38 | 9.1 | 1,180,131 | 448,235 | 0 38 | 6.1 |
| Hard Pine | 653,896 | 431,900 | 0 66 | 3.1 | 1,136,356 | 619,924 | 0 55 | 5.8 |
| Oak | 930,581 | 621,783 | 0 67 | 4.5 | 963,794 | 660,200 | 0 69 | 4.9 |
| Tamarack | 1,772,151 | 786,853 | 0 44 | 8.5 | 838,999 | 355,858 | 0 42 | 4.3 |
| Western Hemlock | | | | | 479,113 | 148,725 | 0 31 | 2.5 |
| Spruce | 818,485 | 325,202 | 0 40 | 3.9 | 450,256 | 148,249 | 0 33 | 2.3 |
| Western Spruce | | | | | 267,917 | 70,688 | 0 26 | 1.4 |
| Chestnut | 286,082 | 157,225 | 0 59 | 1.3 | 232,179 | 126,795 | 0 55 | 1.2 |
| Red Pine | 26,646 | 1,673 | 0 48 | 0.1 | 114,852 | 52,112 | 0 45 | 0.6 |
| Beech | 103,583 | 70,220 | 0 68 | 0.5 | 96,771 | 60,47 | 0 62 | 0.5 |
| Birch | 37,943 | 22,605 | 0 60 | 0.2 | 24,736 | 10,7 | 0 42 | 0.1 |
| Red Cedar | 57,357 | 16,234 | 0 28 | 0.3 | 20,578 | 6,0 | 0 33 | 0.1 |
| Maple | 51,465 | 39,681 | 0 77 | 0.2 | 16,799 | 14,3 | 0 85 | 0.1 |
| Elm | 2,778 | 1,195 | 0 43 | * | 10,328 | 4,440 | 0 85 | 0.1 |
| Ash | | | | | 503 | 216 | 0 43 | * |
| Cherry | | | | | 31 | 17 | 0 55 | * |
| White Pine | 44,227 | 14,965 | 0 34 | 0.2 | | | | |
| Balsam Fir | 12,469 | 1,821 | 0 13 | 0.1 | | | | |

* Less than one-tenth of one per cent.

A total of 19,490,491 ties, or 98.0 per cent of all those purchased in Canada, were used by the steam railways. This total is a decrease of 6.4 per cent from the total for 1912.

The ties imported for use by this class of companies amounted to 3,235,022, valued at \$1,813,256, and formed 16.6 per cent of the total.

The jack pine ties included in this table were made up of two separate species, eastern jack pine (*Pinus Banksiana*), which is cut in every province east of British Columbia, and lodgepole pine (*Pinus Murrayana*), which is cut only in British Columbia and western Alberta. Although this is one of the most widely distributed and abundant trees in Canada, the steam railways reported the purchase of 161,023 imported jack pine ties coming from the United States.

This wood is used for ties chiefly because of its cheapness and abundance and the fact that it is fairly strong. Untreated jack pine ties decay very rapidly in the road-bed, and the practice of treating them to prevent decay is becoming more prevalent each year. In 1913, 709,227 jack pine ties received preservative treatment before being laid in the road-beds of the steam roads of Canada.

Douglas fir ties are fairly durable, and no treated material of this kind was reported in 1913. A small percentage (5.8 per cent) of the Douglas fir ties were imported from the Pacific States.

White cedar (*Thuja occidentalis*) is one of the most durable woods in Canada and has always been a favourite tie material, although its softness makes frequent renewals necessary where the traffic is heavy. Most of the cedar ties used wear out before they decay, and therefore preservative treatment is not necessary under existing conditions. White cedar ties are obtained in Ontario, Quebec and New Brunswick, and 6.6 per cent of those purchased came from the Lake States.

Western larch or tamarack (*Larix occidentalis*) is a hard, strong wood, but one which is not so durable that preservative treatment does not effect a saving in its use. The wood is cut in British Columbia, and 4.7 per cent of the ties used in Canada in 1913 were imported from Washington and Oregon. Altogether only 3.4 per cent of the larch ties were treated.

Eastern hemlock (*Tsuga canadensis*) is cut only in the provinces east of Manitoba, and is not considered a first-class tie material. All the ties of this wood were purchased in Canada, and none were given any preservative treatment.

Oak ties were the most expensive on the list among the more important woods and were used for switch ties and on lines where the traffic was exceptionally heavy. By far the greatest number of the oak ties were imported (96.8 per cent coming from the United States) and were made up of a large number of commercial species. The fact that it pays to apply preservative treatment to a hard, strong, and even durable wood like oak, is demonstrated by the fact that the steam railways in Canada in 1913 purchased 525,623 treated oak ties, this number forming over half (54.3 per cent) of the total.

Hard pine from the Southern Atlantic and Gulf States forms an increasing proportion of the tie material imported into Canada each year. This wood does not grow in Canada, and is the product of at least four different species of pine, the most valuable of which is longleaf pine (*Pinus palustris*). The wood of the hard pines, when used for ties, usually decays before it fails through mechanical wear, and therefore it repays the cost of a preservative treatment that will postpone this decay. Of the hard pine ties used in Canada by the steam railways in 1913, 17.5 per cent were treated.

Western spruce is made up of two species, which are confined for the most part to the province of British Columbia. Engelmann spruce (*Picea Engelmanni*) is found on the Rocky Mountains and in the eastern part of British Columbia and Sitka spruce (*Picea sitchensis*) is cut on the coast. All the western spruce ties were native material, and on account of their rapid rate of decay in the ground, 34 per cent of those purchased were given preservative treatment.

Eastern tamarack (*Larix laricina*) is very similar to the western species, and has always been a favorite tie material on account of its spike-holding qualities. About half the tamarack ties were imported and none were reported to have been treated.

Western hemlock (*Tsuga heterophylla*) is usually considered to be a much better tie material than the eastern species, but in British Columbia, where this tree grows, it has so many rivals among the good tie timbers that it is not used to a very great extent at the present time. All the Western hemlock ties were purchased in British Columbia, and none were given preservative treatment.

Eastern spruce in Canada is made up of three different species that grow east of the Rocky Mountains. All the spruce ties were of native material and none were treated.

Chestnut (*Castanea dentata*) is one of the most durable woods of America, although the wood is not to be classed among the hard, heavy tie materials. Practically all the chestnut ties were imported from the eastern States, and none were treated.

Of the other hardwoods purchased, such as beech, birch and maple, the greater part of the ties were treated before being laid.

Altogether about 12 per cent of the ties purchased by the steam railways in 1913 received some sort of treatment to prevent decay.

Table 5 gives the details of the ties purchased by the 32 electric railways in Canada in 1912 and 1913, by kinds of wood.

TABLE 5.

CROSS-TIES PURCHASED, 1912 AND 1913, BY ELECTRIC RAILWAYS, BY KINDS OF WOOD—Number, Total Value, Average Value and Percent Distribution.

| Kind of Wood. | 1912. | | | | 1913. | | | |
|--------------------|----------------|----------------|----------------|--------------|----------------|----------------|----------------|--------------|
| | Number. | Value. | Av. Value | Per cent. | Number. | Value. | Av. Value | Per cent. |
| Total | 483,362 | 232,195 | \$ 0.50 | 100.0 | 391,223 | 225,086 | \$ 0.58 | 100.0 |
| White Cedar..... | 159,476 | 87,681 | 0.55 | 33.0 | 145,659 | 76,673 | 0.63 | 37.2 |
| Red Cedar..... | 25,000 | 12,875 | 0.51 | 5.2 | 95,000 | 70,567 | 0.74 | 24.3 |
| Jack Pine..... | 25,616 | 14,821 | 0.58 | 5.3 | 66,954 | 33,137 | 0.49 | 17.1 |
| Tamarack..... | 31,545 | 19,196 | 0.61 | 6.5 | 27,232 | 13,808 | 0.51 | 7.0 |
| Hemlock..... | 52,763 | 23,426 | 0.44 | 10.9 | 19,563 | 7,427 | 0.38 | 5.0 |
| Oak..... | 2,925 | 2,391 | 0.82 | 0.6 | 14,760 | 13,044 | 0.88 | 3.8 |
| Spruce..... | 24,636 | 10,292 | 0.42 | 5.1 | 8,000 | 2,800 | 0.35 | 2.0 |
| Douglas Fir..... | 156,930 | 68,032 | 0.43 | 32.5 | 5,982 | 2,439 | 0.41 | 1.5 |
| Elm..... | 90 | 157 | 1.74 | * | 3,348 | 1,981 | 0.59 | 0.9 |
| Western Larch..... | | | | | 2,512 | 1,889 | 0.75 | 0.6 |
| Hard Pine..... | 4,200 | 2,940 | 0.70 | 0.9 | 1,905 | 1,108 | 0.55 | 0.5 |
| Beech..... | | | | | 152 | 152 | 1.00 | * |
| Maple..... | | | | | 61 | 61 | 1.00 | * |
| White Pine..... | 181 | 384 | 2.12 | * | | | | |

* Less than one-tenth of one per cent.

While the electric railways in Canada in 1913 purchased only two per cent of the ties, they paid the highest average price for their material.

The total for 1913 was a decrease of 19.1 per cent from 1912. The two cedar species in this class formed together three-fifths of the total, and jack pine, which was the most important wood used by the steam railways, was of only secondary importance. As a general rule the more durable native woods

were purchased by these companies and the treated ties formed less than one per cent of the total. Oak and cedar ties were imported in the largest quantities, together with all the hard pine, beech and maple. Of the oak ties reported 9.3 per cent were treated, as were all the imported beech and maple ties.

The only western species reported were red cedar, Douglas fir and western larch. These companies paid, on an average, 16 cents a tie more than the steam railways. This price was an increase of 8 cents over that of 1912, increasing with the cedars and with oak. All the other woods showed decreases in average cost.

PRESERVATIVE TREATMENT.

In Canada in 1913 about 10.0 per cent of the cross-ties purchased by both classes of railways were given a preservative treatment to retard decay. The practice is a fairly recent one, as is seen by the fact that in 1910 practically no ties were treated at all, and that the percentage of treated material has increased steadily since that time. The treatment, under present market conditions, is most profitable when applied to the harder, stronger woods that if used untreated would decay before the end of their mechanical life.

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